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EXAMINER

TRAN, KHANH C

ART UNIT	PAPER NUMBER
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2631

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DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/640,963

Applicant(s)

SHOHARA, AKI

Examiner

Khanh Tran

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-20 is/are allowed.
- 6) ☒ Claim(s) 21-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 21, 27, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Razoumov et al. U.S. Patent 6,614,850 B1.

Regarding claim 21, Razoumov et al. discloses in figure 4A a flow diagram of an embodiment of a symbol puncturing technique wherein a number of required punctures P are determined for a particular frame. If the frame has a capacity of N symbols and if S , representative a number of generated code symbols, is greater than or equal to N , then P symbols are punctured, where $P=S-N$. Then, the puncture distance D is computed based on the determined number of symbols S and the number of punctures P . Symbols in the frame are then punctured using the computed distance D . Evidently, S , P , and D would represent compressed puncture mask. Razoumov et al., however, does not explicitly disclose S , P , and D stored electronically. Nevertheless, as well known in the art, it would have been obvious for one of ordinary skill in the art that S , P , and D are saved in memory before symbol puncture is performed.

Regarding claim 27, referring to figure 4A, to perform a symbol puncture using saved S , P , and D , symbols in the frame are counted and the D^{th} symbol is punctured, at step 416. After a symbol has been punctured, the number of remaining symbols is

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determined and the number of required punctures P is decremented, at step 418. A determination is then made whether all P symbols have been punctured, step 420. If all P symbols have been punctured, the process terminates. Razoumov et al., however, does not explicitly disclose the step of retrieving a compressed puncture mask and decompressing the compressed puncture mask. Nevertheless, the information S, P, and D is read back from memory to perform a symbol puncture, it would have been obvious for one of ordinary skill in the art that it corresponds to the step of retrieving the compressed puncture mask. Furthermore, the process of counting symbols in a frame, puncturing Dth symbol, decrementing the number of required punctures P, looping back if P is not 0 would represent uncompressing the compressed puncture mask and performing symbol puncturing.

Regarding claim 32, as recited in claim 27, to perform a symbol puncture using saved S, P, and D, symbols in the frame are counted and the Dth symbol is punctured. It would have been obvious for one of ordinary skill in the art that the Dth symbol corresponds to a 0 in the puncture pattern, which is representative of a first polarity. Any other symbol corresponds to a 1 in the puncture pattern, which is representative of a second polarity.

llf 2. Claims 22-26, 28-³¹~~30~~, 34-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Razoumov et al. U.S. Patent 6,614,850 B1 as applied to claim 1 above, and further in view of Li U.S. Patent 6,385,752 B1.

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Regarding claim 22, said claim is rejected using similar rejection argument of claim 21. Furthermore, Li invention is directed to an improved method of puncturing a convolutionally encoded bit stream provided for specific examples consisting of PCS-4 and PCS-5, these being encoding schemes provided in accordance with the EDGE standard. For PCS-5 in one case, the blocks to be punctured have a size of $L=2422$, and said blocks need to be punctured such that $M=1384$ bits remain. It would be apparent to one of ordinary skill in the art that the length of the puncture mask is more than 1000 bits. Since the foregoing case as taught by Li could be easily implemented with Razoumov et al. method, combining Li and Razoumov et al. teachings would have been obvious for one of ordinary skill in the art.

Regarding claim 23, said claim is rejected using similar rejection argument of claim 22 since blocks with larger size generate longer length of puncture mask.

Regarding claim 24, in addition to the rejection argument of claim 22, Li invention applies to encoding schemes in accordance with existing EDGE standards for PCS-4 and PCS-5.

Regarding claim 25, in figure 1, a puncturing circuit 22 is connected to a puncturing matrix memory 50 wherein the puncturing matrix stores puncture masks. Since the memory is usually large, storing at least 30 puncture masks would have been apparent to one skill in the art.

Regarding claim 26, the puncturing matrix memory 50 is inherently a semiconductor memory.

Regarding claim 29, said claim is rejected using similar rejection argument of claim 23.

Regarding claim 30, said claim is rejected using similar rejection argument of claim 24.

Regarding claim 31, said claim is rejected using similar rejection argument of claim 25.

Regarding claim 34, said claim is rejected using similar rejection argument of claim 25. Furthermore, the puncturing matrix memory 50, in figure 1 of Li invention, can be easily implemented on an integrated circuit.

Regarding claim 35, Li invention relates to improved puncture matrices for use in GSM applications such as EDGE.

Regarding claim 36, said claim is rejected using similar rejection argument of claim 22.

Regarding claim 37, said claim is rejected using similar rejection argument of claim 23.

Regarding claim 38, said claim is rejected using similar rejection argument of claim 24.

Regarding claim 39, said claim is rejected using similar rejection argument of claim 25.

Regarding claim 40, the communication system in figure 1 of Li invention includes a receiver 14 wherein the receiver 14 comprises at least a mixer in the down-converting section as well known in the art.

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Regarding claims 41-42, the communication system in figure 1 of Li invention includes a transmitter 12 wherein the transmitter 12 comprises at least a mixer in the up-converting section, a VCO as well known in the art.

3. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Razoumov et al. U.S. Patent 6,614,850 B1 as applied to claim 27 above, and further in view of admitted prior art.

Regarding claim 33, as recited in claim 27, to perform a symbol puncture using saved S, P, and D, symbols in the frame are counted and the Dth symbol is punctured. It would have been obvious for one of ordinary skill in the art that the process implies reading one symbol at a time and counting the puncture pattern one symbol at a time simultaneously with reading the frame symbol. Razoumov et al., however, does not disclose inserting an erasure and not inserting an erasure as claimed in the instant application. Admitted prior art discloses in the background of invention that a zero indicates a position where an erasure is to be inserted, which corresponds to a first polarity, and a one indicates a position where an erasure is not to be inserted, which corresponds to a second polarity. Since utilizing an erasure is well known in the art, therefore, it would have been obvious for one of ordinary skill in the art to modify Razoumov et al. method to incorporate an erasure as taught by admitted prior art at every Dth symbol.

Claim Objections

4. Claim 17 is objected to because of the following informalities: in line 4, "results" should be changed to -- result --; in line 5, "results" should be changed to -- result --. Appropriate correction is required.

5. Claim 32 is objected to because of the following informalities: in line 3, "results" should be changed to -- result --; in line 5, "results" should be changed to -- result --. Appropriate correction is required.

Allowable Subject Matter

6. Claims 1-7 are allowed.

Regarding claim 1, said claim is directed to a method of compressing puncture mask information. The claim identifies uniquely distinct features "deleting the last k bits of the puncture mask" and "appending k zeros to the beginning of the puncture mask". The closest prior art, Lasne (US 5,850,403) disclosing a differential coding process, either singularly or in combination, fail to anticipate or render the above underlined limitations obvious.

7. Claims 8-18 are allowed.

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Regarding claim 8, said claim is directed to a method of decompressing and using a puncture mask. The claim identifies uniquely distinct features "storing the first k bits of the decompressed differential puncture mask as the first k bits of a decompressed puncture mask" and "starting with the k+1 bit of the decompressed differential puncture mask" and "XORing the k+1 bit of the decompressed differential puncture mask with the 1st bit of decompressed puncture mask resulting in a product". The closest prior art, Razoumov et al. (US 6,614,850) and Li (US 6,385,752) disclosing method of puncturing code symbols, either singularly or in combination, fail to anticipate or render the above underlined limitations obvious.

8. Claims 19-20 are allowed.

Regarding claim 19, said claim is directed to a code puncture apparatus. The claim identifies a combination of uniquely distinct features "a run length decoder ..." and "a differential operator ..." and "a puncture mask register ...". The closest prior art, Razoumov et al. (US 6,614,850) and Li (US 6,385,752) disclosing method of puncturing code symbols, either singularly or in combination, fail to anticipate or render the above underlined limitations obvious.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Laskowski U.S. Patent 5,566,189 discloses "Method and Device for Puncturing Data".

Hammons, Jr. U.S. Patent 6,601,214 discloses "System and Method Employing A Rate Matching Algorithm for Providing Optimized Puncturing Patterns for Turbo Encoded Data in A Communications Network".

Ramesh et al. U.S. Patent 5,668,820 discloses "Digital Communication System Having a Punctured Convolutional Coding System and Method".

Lasne U.S. Patent 5,850,403 discloses "Process of Selectively Protecting Information Bits Against Transmission Errors".

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 703-305-2384. The examiner can normally be reached on Tuesday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 703-306-3034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3800.

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Khai Tran 11/24/03
KHAI TRAN
PATENT EXAMINER